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ABSTRACT

The Politecnico di Torino Joint Committee for Teaching (CPD) has set up an observation system consisting of: a) extended course presentations, b) statistics on examinations, and c) student questionnaires. At the end of each academic year, the CPD publishes volumes containing statistics on examinations, where each course is described by a cumulative curve showing the number of students passing the exam with time (examination sessions); each course is followed for four years. The CPD has also developed a system of questionnaires on teaching quality to be distributed to the students. In these questionnaires, students provide information concerning their attendance rates, work required by the instructor, work load for the semester, classrooms, lecture hall and facilities, teaching abilities of the professor and teaching assistants, and timetables. Questionnaires and examination statistics provide the raw data or "descriptors" used to obtain a system of teaching quality "indicators," which is published yearly and made available to the academic authorities at many levels. (Author/ASK)

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Evaluation of Teaching Quality at Politecnico di Torino

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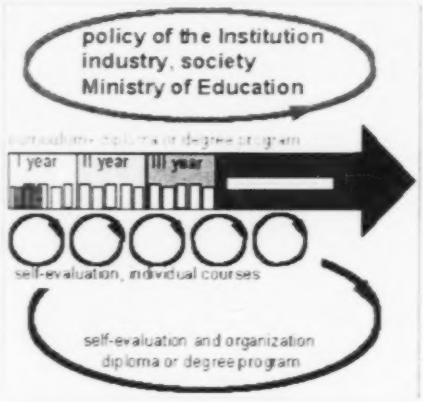
Abstract- *The CPD has set up an observation system consisting of a) Extended course presentations, b) Statistics on examinations, and c) Student questionnaires. At the end of each academic year, the CPD publishes volumes containing statistics on examinations, where each course is described by a cumulative curve showing the number of students passing the exam with time (examination sessions); each course is followed for four years. The CPD has also developed a system of questionnaires on teaching quality to be distributed to the students. In these questionnaires, students provide information concerning their attendance rates, work required by the instructor, work load for the semester, classrooms, lecture hall and facilities, teaching abilities of the professor and teaching assistants, and timetables. Questionnaires and examination statistics provide the raw data or "descriptors" used to obtain a system of teaching quality "indicators", which is published yearly and made available to the academic authorities at many levels.*

Introduction

The quality of university teaching depends first of all on the curriculum, which must be designed to meet the student's future needs as a self-employed professional or as a private or public sector employee, as well as the need to keep pace with change. The curriculum for a degree course must thus state the type of cultural background to be transmitted to the student, and the skills he must show he has mastered. This involves the non-generic preparation of an educational program, which takes the form of the academic institution's "Mission Statement" and consists of a "Reference Frame" for evaluation [1] integrated by appropriate thought on the quality of engineering education, the type of learning required of the student, and the assessment methods [2,3].

The curriculum thus crystallises the intentions established through a feedback loop linking the university's governing bodies and the "customers". Proposed changes to the upper feedback loop will be relatively slow: they must take general political and social needs into account as well as those of the "customers" (including students themselves).

They must be only partially constrained by the resources available to the university, though obviously these constraints are very strong. Below the curriculum level, a number of subsidiary feedback loops can be set up to determine whether the procedures meet objectives, and whether they meet them efficiently.



Since 1993, the Politecnico di Torino Joint Committee for Teaching (CPD) has been working with these subsidiary feedback loops. The CPD is an independent monitoring organisation, but also submits proposals (at an advisory level) to the University's governing bodies. Politecnico di Torino was the first university in Italy to establish a permanent body for observing and evaluating teaching problems, teaching policies, and material means and services connected with teaching.

Several universities in Italy have set up committees which deal with certain aspects of teaching. Only the Politecnico di Torino, however, has a CPD, characterised by the following features:

- It is a permanent body.
- It consists of an equal number of professors and students (8+8).
- It has the statutory task of organising a permanent observatory on the functionality of teaching activities.
- It has the statutory task of evaluating the effectiveness of the policies implemented by the bodies which deal with teaching.

To assist in setting up the "subsidiary feedback loops" in a spirit of continuing self-evaluation, "indicators" are provided for:

- Rector and Academic Senate,
- Faculties,
- DCB-Degree Course Boards,
- individual instructors.

They are described at the end of this contribution.

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Observation Activities

From 1993 to 1997, the CPD formulated, employed and perfected observation tools capable of producing the "descriptors", whose definition was in itself a demanding task. To this end, the CPD has launched a co-ordinated system of integrated observation tools:

- Extended Course Presentations
- Statistics on Examinations
- Student Questionnaires on the quality of teaching

From the early development of these tools, the CPD has worked to:

- Deal with problems with a global vision, while suggesting particular solutions for each tool through experimentation and evaluation of its feasibility;
- Inform the university bodies of the actions undertaken, gathering their opinions.

Every effort has been made to make it clear to all concerned that each of these observational tools is part of a comprehensive, single design. An objective difficulty was that a portion of the faculty perceived these tools in a fragmentary manner, or simply did not share some or all of their aims.

Extended course presentations were proposed by the CPD with a dual purpose:

- To give students a better insight into the course so that they can organise their semester work, arrange their choices, plan their study and know inadvance what is expected from them.
- To give those responsible for running the Degree Courses means for monitoring course contents, the extent of their treatment, requirements andworkload, examination techniques, and the abilities that the student is expected to develop.

It is clear that the first point is instrumental in establishing a sort of contract between teacher and student, where both act in a context of mutual exchange so that final evaluation can be based on comparison with the objectives stated in advance. It is also clear that the second point gives the governing bodies (particularly at the DCB levels) a tool for monitoring the system so that they can make timely corrections in accordance with the institution's policies. Moreover, it provides them with a more factual basis for evaluating the results from the other two tools.

The Extended Course Presentation is not only a useful document for students to help them plan their activities during the scholastic year, but is also a declaration of intent by teachers which helps to co-ordinate those teaching disciplines that serve a common didactic aim. It also serves as a means of comparison with the results of the student Questionnaire. Finally, the Presentation is considered indispensable for adopting the ECTS within the Socrates project.

After a year or so of discussion, it was decided to incorporate most of the features suggested by the CPD in the course presentations. Following collaborative discussions between the deans, the DCB and the Student Services, the Student Handbook now being printed has been doubled to include a minimum of two pages per course.

Student Questionnaires on Teaching Quality

Student questionnaires on teaching quality are strongly oriented towards evaluating individual teaching as a part of an organized system. Questionnaires consist of two parts: one is an OCR form containing the questions whose answers are processed by the CPD and are used as the basis for their evaluation.

The second is a free-form sheet for "personal comments", which are received directly by the individual professors, are strictly confidential, and act as a communication vehicle between class and professor. These sheets are anonymous, which spurred initial opposition from around 15 to 20 % of the professors.

The form (version 1997/98)contains several questions grouped as follows:

- Part A: Six questions on the student, his position, and prior education.
- Part B: Three questions on the attendance rates for lessons and practice sessions, and the examination strategy.
- Part C: Four questions on the course organisation, lecture rooms, material resources.
- Part D: Three questions on the context of the course (weight of parallel courses, general work load, timetables).
- Part E: Twelve questions on the professor, his performance, his ability to communicate, his commitment.
- Part F: Six questions on the teaching assistants.
- Part G: Three control questions (global evaluation, motivation).

Students are asked to assign ratings by case or by value on a 1 to 5 scale (1 = worst, 5 = best).

This set of questions gives a thorough view of how the student evaluates the course and the professor (and his assistants) in relation with the others and with the facilities made available by the institution. It requires complex processing which is performed at the end of each semester and again following departmental checks at the end of every academic year.

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The student questionnaires on teaching quality underwent a long process of revision and experimentation. As a result of much reflection regarding the organization of the questionnaires, the CPD decided on the following ways of distributing the results:

- Each teacher receives all raw data pertinent to his/her courses
- CPD members, Rector and deans have access to all raw data - "descriptors"
- Department heads and chairmen of the DCBs have access to raw data concerning the teachers in their department / DCB

After examining the questionnaires from the previous academic year, the CPD decided on two courses of action regarding those situations that required further control.

Improper Use of the "Personal Comments" Form

Many teachers, particularly in the first year courses, pointed out examples of an inappropriate use of the "personal comments" form. In many cases, the comments made on this form were of a non-constructive, personal nature. Behind the shield of anonymity, these comments were in some cases blatantly offensive. The CPD first of all wanted to discover the dimensions of this phenomenon, and to this end formulated a brief questionnaire. It was discovered that the phenomenon was not uniformly distributed, but concentrated primarily on certain cases, particularly in the first year courses. The CPD initially considered the possibility of not distributing the questionnaires for the first year courses. Nevertheless, the majority of teachers indicated a desire to continue to use the forms as a valid communication tool for improving teaching quality. The CPD introduced several changes, hoping to provide students with a better understanding of the type of response that is requested of them.

Non-Distribution of Questionnaires

A number of questionnaires was not distributed in the first year the programme was introduced. This was partly due to difficulties in starting up the CPD procedure, and partly to the position taken by a teachers' organisation, which opposed the questionnaires. In addition, certain teachers failed to distribute the questionnaire and, furthermore, did not justify their reasons. The CPD therefore decided to give students the possibility of completing these questionnaires either at home or at an appropriately discreet location during the month of September. To this end, the students received a letter sent directly to their residential address. Student response to this initiative was extremely limited, and the CPD was able to carry out purely indicative processing, based on those few disciplines that registered a response above 20%. This experience is not to be repeated.

Tab. I: Overall redemption rate A.Y. 1996/97

School or Faculty	*N*	*Nd*	*Nr*	% *Nr/Nd*
Architecture	203	26905	7930	29
Diplomas	355	14504	8195	57
Eng. Torino and Mondovi	540	55787	23328	42
Eng. Vercelli	86	3747	2271	61
Total	1184	100943	41724	41

N = Total monitored courses,
Nd = Total no. of questionnaires
Nr = Number of redeemed questionnaires

The operation questionnaire is now applied to all courses of Politecnico di Torino.

Tables I and II provide statistics on the Student Questionnaires from Academic Year 1995/96, when the response appeared to have stabilized.

Courses with less than 10 students are not required to distribute the questionnaires. However, they may ask to participate in the operation, in which case they are included in the statistics.

Tab. II: participation rate of teaching staff

	Academic Year 1995/96			Academic Year 1996/97		
School or faculty	*N*	*Nd*	*%Nnd/N*	*N*	*Nnd*	*%Nnd/N*
Architecture	185	18	10	203	27	13
Diplomas	256	13	5	355	38	11
Eng. Torino/Mondovi	523	24	5	540	25	5
Eng. Vercelli	78	0	0	86	4	5
Total	1042	53	5	1184	94	8

N = Total monitored courses,
Nnd = Monitored courses where questionnaires were not distributed

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Statistics on Examinations

The statistics on exams and their temporal sequence are the first objectives achieved by the CPD. The collaboration of the NPS, the SIA, the Student Service of the Politecnico and the deans were all vital in reaching this goal. From the beginning, the CPD demonstrated the need to make data regarding the students' educational progress available at regular intervals. In connection with similar needs expressed by the university teaching bodies, it contributed to the formation of a centralised information service under the responsibility of the SIA, which gathers the data and makes it compatible with data arriving from the Student Services and the deans. Procedures for gathering and processing the data have been standardised and by now are almost entirely error-free. The results are sent to the appropriate department heads, who forward them to the teachers for any necessary corrections and observations. At the end of this validating procedure, the information is sent to the Rector, the deans, the CSCD, the academic authorities and the Student Services. Copies are available at the offices of the CPD and in the university libraries for public scrutiny.

The observed "universe" is the cohort of students enrolled for the given course in the given academic year. They are followed for four years in order to highlight when the examination is passed. A cumulative curve is then obtained, which should ideally tend to 100% with features which vary from course to course. The basic parameters which are extracted from these data (% of pass at the end of the semester, % of pass at the end of the academic year) are correlated with those from the questionnaires and form the basis for identifying obstacles to student careers.

The following figure shows an example of examination pass curves. Note that I, II, III are the examination sessions available to the students during the year (January-February, June-July, September). The figure shows four curves because follow-up lasts four years, and this course was given by the same professor over that time. dropout students, i.e. those who have abandoned the course (transfers or exit from university) should be subtracted from the initially enrolled number.

This is of interest to the first year courses, which are affected by a higher dropout rate. However, in order to preserve the shape of curves over the years concerned , this reasonable correction is not applied, though it is visually suggested by the fact that the asymptote is less than 100%.

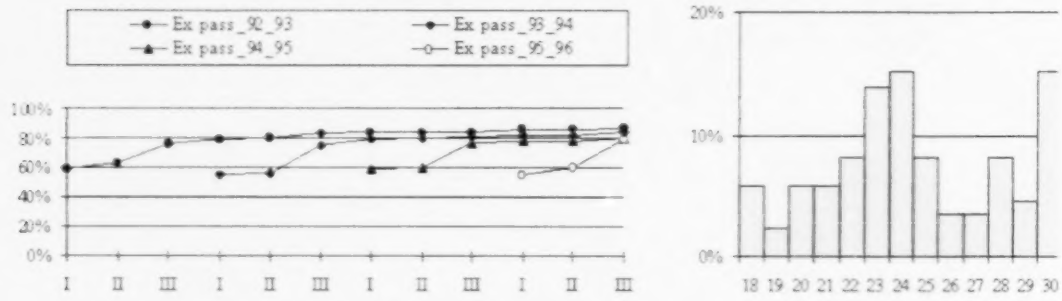

Fig. 1: Typical record for course X given by professor Y over four years left: cumul. pass curves, right: distribution of marks (earliest avail. Acad. Year)

Indicators

Raw data or "descriptors" from questionnaires and examination statistics are processed to obtain "indicators" of teaching performance. Their development was and remains the object of much debate and controversy. They try to satisfy conflicting requirements: to give a correct and exhaustive portrait of the situation while conveying information simply and quickly. Homogeneous groups of descriptors are combined together into a reduced number of indicators ordered by columns. Each column describes a course and its teacher instructors; it is transmitted to the teacher. Columns are grouped in "sheets", each relating to a given year of a given degree course. The collection of sheets for the same degree course (three for Diploma, five for "Laurea") are transmitted primarily to the chairman of its DCB. The entire collection is made available to the academic authorities; at the moment it is not disclosed to the public.

A sample sheet is shown in figure 2. Each indicator is ranked in a value scale: 1: Very poor, 2: Poor, 3: Acceptable, 4: Good, 5: Very good. In order to facilitate quick inspection, a system of colours is adopted: black - possible problem area, grey - average values, white - better than average.

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The sheet is complemented by a table showing the distribution of students according to number of exams behind and number of years behind. All indicators of the sheet concern only "R-regular" students; however, this table also contains data on "F-fuori corso" students, i.e. students enrolled on a different basis due to excessive examinations behind. A bar diagram shows the distribution of "regular" students by number of exams behind.

Fig. 2:sample sheet of indicators for "XX Degree Course", III year, semesters I and II

XX Degree Course	**III Year**					
Academic Year 1995/96	**Semester 1**			**Semester 2**		
% of passed exams, end semester	68	5	66	29	43	5
% of passed exams, end Acad. Year	85	12	73	48	50	7
% of lessons attended	94	93	95	88	97	93
% of tutorials attended	94	93	93	96	96	71
Sufficiency of tutors' number	4	3,6	4,2	4,4	4	4,6
Adequacy of classroom space	3,8	4,6	4	3,7	4,6	4,6
Total semester workload	3,5	2,7	3,1	1,2	3,4	3,4
Workload of this course	4,1	2,1	2,3	1,6	3,1	2,6
Rationality of timetable	4,7	4,5	4,2	3,1	4,3	3,8
Overall organization of the course	4	3,6	4,3	3,2	4,5	3,7
Lecturing effectiveness	3,8	2,9	4,3	2,1	4,5	3,4
Teacher's commitment and availability	4,3	3,7	4,6	3,7	4,7	3,9
Tutorial instructors' effectiveness	3,9	3,4	4,5	4,1	4,3	3,5
Effect. part-time student assistants	NA	NA	3,9	1,9	4,2	3,1
Student interest in the subject	3,6	3,8	4,2	2,3	4,4	3,4
Student estimate of course relevance	3,2	4,2	4,4	2,1	4,6	3,6
Course title	Title of course 1	Title of course 2	Title of course 3	Title of course 4	Title of course 5	Title of course 6
Course code	*T0xy00*	*Tpqm00*	*Txz000*	*T0xt000*	*Taba00*	*T0adf0*
Teacher name	Prof. 1	Prof. 2	Prof. 3	Prof. 4	Prof. 5	Prof. 6
Main reasons for low lesson attendance	-	-	-	-	-	-
Main reason for low tutorial attendance	-	-	-	-	-	A(3)
% redeemed questionnaires	-	29	71	93	86	29
No. enrolled students	48 (48)	49 (49)	48 (48)	48 (48)	48 (48)	48 (48)
Faculty / City identifier	XY	XY	XY	XY	XY	XY

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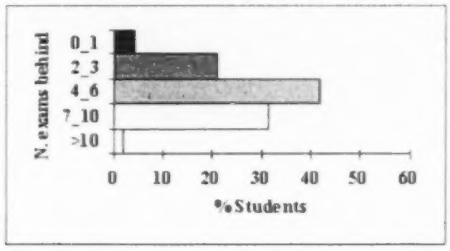
N. exams behind	Delay (years) →	0		1		2_3		4_6		7_10		>10		Tot.	
		% Reg.	% FC.	% Reg.	% FC.	% Reg.	% FC.	% Reg.	% FC.	% Reg.	% FC.	% Reg.	% FC.	% Reg.	% FC.
	0_1	4,2		,		,		,		,		,		4,2	
	2_3	18,8		2,1		,		,		,		,		20,8	
	4_6	31,3		8,3	*11,1*	2,1		,		,		,		41,7	*11,1*
	7_10	16,7		6,3	*33,3*	4,2	*33,3*	2,1	*22,2*	,		,		31,3	*88,9*
	>10	,		2,1		,		,		,		,		2,1	
	Tot.	70,8	,	18,8	*44,4*	6,3	*33,3*	2,1	*22,2*	,	,	,	,	100,	*100,*

% Distribution of
Ni Regular (Reg) students and of
Nf Fuori Corso (FC) students by years of delay and exams behind



Distribution of Ni regular students by number of examinations behind.
Ni=48
Dropouts = 0
Fuori Corso (FC)= 9

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[1] "Comité de Ingegneria y Tecnologia - Marco de Referencia para la Evaluación", F. Ocampo et al., CACEI, C. Mexico, June 1996

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